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Death Ray Weapons Bid to Outflank SALT Arms Efforts

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As the Soviet Union and the United States near completion of a treaty to limit their long-range missiles and bombers, both nations are moving ahead with death ray technology that could change future warfare.

Senior U.S. officials say the Soviets are building prototype weapons based on one form of this directed energy technology, using high-energy lasers. The United States knows how to make laser weapons but so far thinks high-speed missiles can do the same job better.

There is dispute here about how far along the Soviets are in developing the other militarily interesting prospect for a death ray device. It would use a beam of highly charged atomic particles. U.S. scientists do not yet know how to make a particle beam weapon.

But American laboratories are working on it with Defense Department funding. After a caustic debate that divided both the scientific and intelligence communities over the value of U.S. or Soviet particle beam work, the Pentagon has pulled together pieces of old research programs into a coordinated study of weapons applications.

SOME OFFICIALS picture the recent decision to establish a coordinated program as no great change from the piecemeal efforts long under way. But those who had been on the losing side of the debate, while warning that this country was falling behind the Soviets in a vital field, feel there has been a policy reversal that vindicates their position.

Both lasers and particle beams can deliver potentially destructive energy on a target with the speed of light — 186,000 miles a second. Lasers can destroy by transmitting energy in the form of light, somewhat the same way a fire can be started with a magnifying glass and sunlight. Particle beams are more like lightning bolts that burn their way through the atmosphere to zap their target.

The new strategic arms limitations treaty, SALT II, restricts offensive weapons. It does not restrict defenses against them. A 1972 Soviet-American treaty limits one type of defenses, against ballistic missiles, although it does not prohibit research on them.

Laser or charged particle beams could become radically new forms of ballistic missile defenses if major physics and engineering problems are overcome. A virtually instantaneous ray that could wreck an attacking missile while it is still out in space seems like the ultimate defense.

The possibility that the Soviet Union might be developing such a defense, and could put it into operation either secretly or after denouncing the 1972 treaty, has worried those who accept the feasibility of high-energy weapons. It raised the prospect of the Kremlin's threatening the United States with nuclear attack while itself immune to counterattack — thus holding this country at its mercy.

FOR YEARS SUCH fears were dismissed by skeptics who said the physics problems were too great, particularly with particle beams. The skeptics, including many leading U.S. scientists, insisted the Soviets were wasting their scientific talent and money. They argued that the United States should not do the same.

Despite the argument, this country is now in a race with Moscow in death ray development. Advances in lasers and a reassessment of particle beam possibilities have given new impetus to both types of high-energy work in the United States.

The concept of particle beam weapons developed out of research into basic physics using the high-energy devices known to the public as "atom smashers." The same principles that are used to split atoms can be used to explode bricks by pumping atomic particles into them.

For more than 20 years U.S. scientists have sought ways of generating beams and sending them through the atmosphere so that effective energy will arrive at a target rather than being dissipated on the way. But the difficulties have been immense.

After a decade of intensive effort, "people in the program just got worn out," according to a physicist then in a group that included Harold Brown, who is now the defense secretary. "Every summer we had a new invention to solve some problem, and every winter we'd find out why it didn't work. We realized that in the end we were not delivering much effective energy on a target."

THE 1972 MISSILE defense treaty reduced U.S. interest in particle beam problems. At the same time, new ways to raise the gross power output of lasers increased their weapons potential.

The capability of laser weapons to shoot down short-range attack missiles has been demonstrated. But, being shafts of light, laser beams cannot penetrate clouds. They therefore cannot be depended upon for general purpose defense of warships, one of the likeliest applications.

Some Pentagon officials take the attitude that there is no sense in building them if laser weapons would only be supplemental defenses, added to high-speed missiles to defend ships against missile attack, for instance. But others point out that redundancy in defenses is common and advocate developing laser weapons.

Research is continuing on ways to increase the power of lasers while reducing the weight and bulk of the equipment. A theoretical goal is a small enough device to be put into a satellite above the atmosphere, where unhindered by clouds it could be an effective missile defense weapon.

The Soviet Union is presumably looking at such uses. "We estimate that the Soviets are at about the same level of technology as the United States, and facing the same kinds of (laser weapons) systems problems that we're facing," according to William J. Perry, the under secretary of

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defense for research and engineering.

"BUT THEY'RE making four or five times the effort we are, and they've evidently made the decision to build prototype weapons," Perry said in an interview.

The Kremlin has often in the past authorized prototypes of weapons that are not fully proven and then later scrapped them. The United States takes a more cautious approach of extensive research before putting money into hardware.

Perry also said that the Soviets "evidently have a very significant research program" on particle beams. "I don't believe they have a weapons program in this field."

This is the Pentagon's official judgment, but it is a controversial one.

About the time the U.S. scientific community was ready to give up in frustration with particle beam research, air force intelligence headed by Maj. Gen. George J. Keegan Jr. began to detect signs of that very significant Soviet research program. But few people would listen.

In the early and mid-'70s, Keegan ran a maverick intelligence operation that kept coming up with warnings about Soviet military activities. Both the CIA and the Pentagon's own Defense Intelligence Agency took skeptical attitudes toward his work, but he was later accepted as the first to spot a number of important developments.

KEEGAN CONTENDED that at a massive, expensive research facility at Semipalatinsk in Soviet Central Asia the Soviets were well on the way to solving the problems of particle beam weapons and could within a few years have an effective missile defense system. The rest of the intelligence community scoffed.

The CIA brought together a panel of leading scientists to study the evidence. They denied that the Soviets could be doing anything threatening.

But Keegan argued that these were the same scientists who had failed to make breakthroughs in particle beam research themselves. They were therefore unable or unwilling to accept that the Soviets might be solving the problems that stumped them — although the objective evidence indicated they are, Keegan said.

He retired from the air force in early 1977 and went public with his warnings. When The Star took the first close public look at them, in March 1977, the intelligence community sought to discredit Keegan with the weight of scientific opinion against him, but no firm conclusion was possible.

Later when other publicity was given Keegan's statements about Soviet particle beam work, especially by Aviation Week magazine, Defense Secretary Brown dismissed them. But a panel of 53 physicists and engineers was named under Perry's deputy, Dr. Ruth M. Davis, to re-examine the subject.

THE STAR REPORTED last January that the panel had recommended that the Pentagon move ahead with research on particle beam weapons. As a result, funding is being increased rapidly.

One possible interpretation of the panel's finding is that Keegan has been vindicated — that scientists in this country now accept that it is possible, or at least might be possible, to overcome the physics and engineering problems that have so far frustrated American researchers.

Many scientists and official administrators of military science programs remain skeptical. One says the Soviets are wasting their money, thereby implying that the United States should keep its program down to avoid duplicating the waste.

But Davis is enthusiastic. Testifying to the Senate Armed Services Committee two months ago, she said she believed that, "if the difficult technical hurdles facing directed energy technology are surmounted, the application of this technology to military needs may revolutionize both strategic and tactical warfare."

The Defense Department now believes that the "if" qualification is not large enough to make U.S. research a complete waste.

Davis said that by Sept. 30 $1.27 billion will have been spent on high-energy laser technology, and another $1 billion will be spent by 1985 in completing "lethality demonstrations." Research to determine particle beam weapon feasibility is to cost $29.3 million in the 1980 fiscal year she said. A [illegible] developed to cost $315 million.